04.08 GROUND AND WATER CHARACTERISTICS. Land planes shall be maneuverable on the ground and shall be free from dangerous ground looping tendencies and objectionable taxiing characteristics. The seaworthiness and handling characteristics of seaplanes and amphibians shall be demonstrated by tests deemed appropriate by the Administrator. (See Sec. 04.452 for water stability requirements.)

1. Ground Characteristics

Taxiing tests should be conducted on smooth and rough ground as may likely be encountered under normal operating conditions. Speeds should be used which should vary up to approximately 70 percent of stalling speed. Particular attention should be paid to the following:

Taxiing over rough ground.--There is some evidence to indicate that critical loads can be built up in taxiing over rough ground, even when the shock-absorbing system is entirely satisfactory with respect to capacity for landing purposes.

Brakes.--Their adequacy in maneuvering on the ground and their tendency to cause nosing-over should be investigated. Any bad tendency will normally be exaggerated when taxiing in a strong side or tail wind.

2. Water Characteristics

In order to check water stability, taxiing tests should be made cross wind in a fairly strong breeze.

Sailing ability should be investigated by actually sailing the aircraft with appropriate use of the engine.

Porpoising tendencies should be investigated and reported upon for extreme loading combinations.

Ability to maneuver up to and while on the step should be investigated and reported on.

Effectiveness of the water rudders when provided should be checked.

3. Ski Handling.--General

In the case of skis, the interpretation is that satisfactory landings and take-offs are required, as well as satisfactory ski trim in normal flight.

During landings, take-offs, taxiing, etc., particular attention should be paid to the following:

a. No undue directional instability.

b. Satisfactory ability to make normal speed taxiing turns without undue skidding tendency.

c. No undue tendency to have the nose of each ski digging in during landings or take-offs.

d. Trimming gear adequate with no danger of damage occurring during normal ground handling in taxiing or maneuvering over rough snow or drifts.

e. Ski trim in flight stable and satisfactory for all normal flight attitudes including slips and skids.

f. If braking devices are employed, attention should be given to adequacy, effectiveness, and protection during normal operation on the ground. Positive action should be required.

04,71 MODIFIED PERFORMANCE REQUIREMENTS FOR MULTIENGINE AIRPLANES NOT CERTIFICATED IN THE TRANSPORT CATEGORY.

The weight of any multiengine airplane manufactured pursuant to a type certificate issued prior to January 1, 1941, may be increased beyond the values corresponding to the landing speed specified in Sec. 04.700 and take-off requirements of Sec. 04.701, subject to the following conditions:

(A) The increased weight shall be known as the provisional weight (Sec. 04.103). The standard weight (Sec. 04.102) shall be the maximum permissible weight for landing. The provisional weight shall be the maximum permissible weight for take-off.

(B) Compliance with all the airworthiness requirements except landing speed and take-off is required at the provisional weight, except that the provisional weight may exceed the design weight on which the structural loads for the landing conditions are based by an amount not greater than 15 percent, provided that the airplane is shown to be capable of safety withstanding the ground or water shock loads incident to taking off at the provisional weight.

(C) The airplane shall be provided with suitable means for the rapid and safe discharge of a quantity of fuel sufficient to reduce its weight from the provisional weight to the standard weight.

(D) In no case shall the provisional weight exceed a value corresponding to a landing speed of 5 miles per hour in excess of that specified in Sec. 04.700, a take-off distance of 1,500 feet in the case of landplanes, or a take-off time of 60 seconds in the case of seaplanes; nor shall any provisional weight authorized in respect to any type of airplane after January 1, 1945, exceed the value corresponding to a rate of climb of at least 180 feet per minute at an altitude of 5,000 feet with the critical engine inoperative, its propeller windmilling with the propeller control in a position which would allow the engine (if operating normally and within approved limits) to develop at least 50 percent of maximum except take-off engine speed, all other engines operating at the take-off power available at such altitude, the landing gear retracted, center of gravity in the most unfavorable position permitted for take-off, and the flaps in the take-off position.

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Corrections.--In case it is considered necessary to use the weight or other correction in obtaining the true rate of climb in these check climbs, it will be acceptable to make these corrections as outlined in Flight Engineering Report No. 3.

2. <u>One Engine Inoperative Performance Tests</u>

The primary purpose of the requirements of 04.723 is to obtain the information necessary to inform the pilot of the one engine inoperative performance of the airplane under any condition likely to be encountered following an engine failure during the life of the airplane.

Unless some special reason is involved, "such weights as are necessary" is to be the maximum weight for which certification is sought. In order to accomplish this purpose it is necessary that sawtooth climbs be conducted. The nature and number of these sawtooth climbs should be the same as those described under 04.702 for the third purpose involved, except that the critical engine as determined immediately above is to be inoperative and the airplane is to be otherwise in the condition most favorable to climb, i.e., flaps retracted, inoperative propeller feathered or windmilling in high pitch. Cowl flaps, if present, are to be in the position that is used to demonstrate compliance with the cooling requirements as specified is 04.640.

In the past, the information which has been placed in the hands of the pilot concerning the one engine inoperative performance has been limited to a usable ceiling, i.e., the altitude in standard air at which the best rate of climb is 50 feet per minute. In order to accomplish the above purpose, however, it is obviously necessary to go beyond this and it is requested that the applicant furnish a chart showing the one engine inoperative best rate of climb and the corresponding true indicated airspeed against altitude at various weights covering the range of weight at which the airplane is likely to be operated. Provision should be made for keeping the chart, once it is approved, in the airplane at all times in a place conveniently accessible to the pilot.

Acceptable Method.--Same as described under 04.702 except additional data will need to be recorded.

Corrections.--The corrections necessary to determine the actual rate of climb are described in Flight Engineering Report No. 3.

04.724 AIRSPEED INDICATOR CALIBRATION. In accordance with Sec. 04.5800, the airspeed indicator of the type airplane shall be calibrated in flight. The method of calibration used shall be subject to the approval of the Administrator.

04.725 CHECK OF FUEL SYSTEM. The operation of the fuel system shall be checked in flight to determine its effectiveness under low fuel condition and after changing from one supply tank to another. (See Sec. 04.620.) For such tests low fuel is defined as approximately 15 minutes' supply in each tank tested at the maximum (except take-off) power certified.

1. General

a. The fuel system should be checked in flight to determine that it will feed satisfactorily in climbs at the best angle of climb speed and at the best gliding angle. Moderate rolls, slips and skids as might be made accidentally in the above climbs and glides with low fuel should not cause the engine(s) to cut out. The system should also feed promptly after one tank has run dry and the other tank is turned on.

b. Low fuel for the purpose of fuel system tests in flight is defined as approximately (METO HP + 40) gallons in the tank tested. Each tank will be tested unless the arrangement of the system indicates identical results would be obtained. Special rulings will apply in cases of fuel systems with several small tanks which would result in an unreasonably large amount of residual fuel. If the fuel system has only one tank, the engineering inspector may at his discretion during official tests request the installation of a temporary auxiliary fuel tank for low fuel flight tests in order to avoid the possibility of a forced landing due to lack of fuel.

c. Fuel systems of single engine aircraft shall not be considered satisfactory if more than 10 seconds elapse after changing over from a tank which has run dry in flight, before the engine resumes full power operation.

d. Systems with tank outlets and vents interconnected and so arranged that it is impossible to feed from each tank individually should be treated as single tank systems.

2. Acceptable Method

Single or individual tank tests.--(1) Flight tests should be conducted with fuel arranged in the tanks so that each tank can be tested separately with low fuel but always with a safe amount of fuel in another tank. (2) If the aircraft has only one tank, the take-off will be made with a safe amount of fuel and the tests conducted with low fuel as defined above. (3) The tests should be conducted by changing over to the tank with low fuel after a safe altitude is reached. Each position or attitude should be maintained for a period sufficient to interrupt flow at the carburetor should the feed ports be uncovered. (4) Tests should include steady climbs with maximum permissible XXX